

# **Prospectus**

**A Workshop to Establish Techniques  
And Methods for Identifying, Detecting, Locating,  
Measuring and Determining Effectiveness of  
Control Measures for Invasive Exotic Plants:  
Developing and Applying Uniform Approaches  
Across  
The Florida Landscape**

# Background

Congress established the South Florida Ecosystem Restoration Task Force and Working Group (SFERTF&WG) to help coordinate the enormous task of Everglades Restoration among the many different, and often disparate, agencies and organizations that effect or may be affected by this multibillion dollar restoration program. The Task Force and Working Group recognized invasive exotic species as one of the most serious impediments to restoration and in 1998 established the Noxious Exotic Weed Task Team (NEWTT) to address the problems and management of invasive exotic plants.

The Noxious Exotic Weed Task Team is made up of agency representatives from federal, state, local, and Indian Tribal governments. NEWTT members include managers and scientists from key federal, state and local government agencies and Indian Tribal representatives that deal with exotic pest plant issues.

The SFERTF&WG directed NEWTT to produce an assessment and strategic plan to address the issues of invasive exotic plants for Florida. Those reports have been completed and an implementation plan for the tasks outlined in the strategy is being formulated.

One of the tasks identified in the strategic plan calls for "harmonizing" agency activities and developing fundamentally compatible and interoperable means for managing invasive exotic plants. Another of the strategic plans' tasks includes the need to identify, locate, and determine the extent of populations of invasive plants, and the success of management actions. Currently each agency uses different methods, scales, technologies, and analysis techniques to acquire and develop information regarding the detection of invasive exotic plants. As a result of the rather large amounts of information being collected on the distributions of invasive exotic plants, and the use of disparate methods and techniques, no one is able to develop a comprehensive and synoptic picture of the problem for even one species.

## P<sub>roblem</sub>

There is little Florida-wide uniformity or consistency among agencies in the way they regulate, fund, manage, track, map, determine control success or manage invasive exotic plants. One particularly onerous problem has been trying to place invasive exotic plants and documenting the effects of different agency management actions in some geographical reference system that is consistent and interoperable among agencies. Detection systems are useful for locating and identifying infestations, monitoring populations, and documenting control activities. Field level surveys and remote sensing techniques are available and being used to detect invasive exotic species. However, numerous different methods of varying quality exist and each agency and organization individually determines which methods to use and how to apply their findings. The result is that none of the information being collected among the agencies is cross-compatible and cannot be used to develop a comprehensive understanding of the geographic nature of the problem nor provide any relative understanding of the success (or failure) of management programs.

## Q<sub>uestions</sub>

Three basic questions are at the heart of detection and mapping of invasive exotic plants.

1. What is the best method or methods for detecting invasive exotic plants?

Numerous techniques are available for vegetation mapping and community or species classification. However, invasive exotic plants pose two particularly difficult detection problems. First, small populations and single individuals of any species are especially hard to detect, yet individuals of these species may be important to locate for control purposes as outliers are often the key to gaining maintenance control of some exotics. Second, many of these species are individually difficult to detect, particularly through remote sensing methods. They often have detection signatures that are not sufficiently distinct from surrounding vegetation to be easily isolated.

2. At what scale, or scales, should they be detected, what population size

or geographic areas are reasonable, and can these methods serve the different users and user needs?

Any methods used for detecting species distributions should at least provide 1) accurate locations, 2) an estimate of how many plants there are in given areas (density), and 3) where control actions are being taken, some ability to determine the success of such actions. A set of compatible survey methods is needed that may be used by all agencies to provide coherent and integrated information while still addressing individualized survey needs. These methods should be developed so that they are hierarchical in nature and may be expanded or collapsed in a GIS framework in order to make them compatible for mapping and analysis (see Figure 1). Different survey techniques are required to address different characteristics of a species or habitat, life stage, density, etc. For example a small park may want a method to detect virtually every exotic plant where local eradication is the goal, but to assess a species distribution throughout an ecosystem or determine control success on a statewide level, a more general assessment technique using remote sensing may be appropriate.

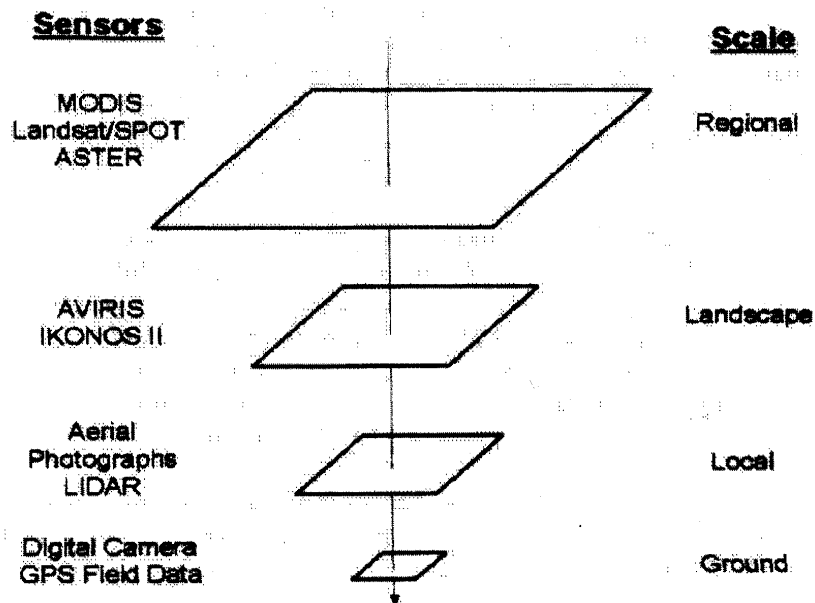


Figure 1. Multiscale image database for regional, landscape, local and field applications

3. Are current detection methods available (or can methods be developed to enhance our ability) to determine which parts of the ecosystem are more susceptible to invasion and why?

Detecting individual species of varying densities of invasive exotic species is most useful where those data are placed in the larger ecological context.

Surrounding land-use patterns, hydrological conditions, soil types, plant community distributions, etc. serve to provide extremely useful information related to the distribution of invasive exotic plants. These species do not invade areas irrespective of the ecological conditions or physical characteristics of the areas they invade. Indeed, invasion patterns may well provide key information on what regions, communities, soil formations, hydrological conditions, etc. may be most susceptible to invasion, by which species or congeners and why. It may also provide insight into the ability to predict which areas may be impacted first and offer some capability in preemptive management.

In medical terminology, are there risk factors for invasion in general, and for invasion by particular taxa? If so, at what spatial scales and with which survey methods can these risk factors be measured? Further, are these risk factors merely predictive symptoms, or do they provide guidance for management actions to reduce the risk of exotic plant invasion?

## Solutions

NEWTT proposes to develop a workshop sequence to evaluate the methods and techniques currently being used to detect vegetation characteristics, and new methods or techniques being tested to help develop a series of interoperable, integrated approaches to invasive exotic plant identification, detection and evaluation.

At least one (preferably several) specialist in each of the areas of detection and analysis deemed appropriate would be invited to present their findings and techniques. This would include research and applications of different detection scales from field-level approaches to low-altitude photography, hyperspectral imagery, satellite imagery, videography, etc. (see Figure 1). While much of the ongoing work may not be occurring in Florida much of it may be applicable to our needs. Presenters would be requested to evaluate the application of their work to detection of invasive exotic plants specifically, and Florida applications generally.

A blue-ribbon panel of experts in GIS, remote sensing and mapping, detection, and spatial and temporal analysis would be selected by NEWTT to review the work of the presenters and provide an evaluation of the best possible set of methods and techniques that may provide a solution to the problem of detection, mapping, interagency data-compatibility, and analysis. Their evaluation will include a review of the most pertinent methods or techniques that may be currently applicable, options for integrating the use of these methods and making them analytically compatible, suggestions for new techniques or technology that may prove valuable with further testing and evaluation, and suggestions for developing protocols and research to assist in the development or application design of

existing and new technologies.

NEWTT members and agencies would use these workshop findings and results to coordinate the development of an integrated set of compatible methods for multi-agency use, and to develop funding initiatives for the further refinement and development of methods and technologies that either need to be adapted for invasive exotic plant management uses, or for testing and applying new technologies.